EIA INTERIM STANDARD

Axial Lead Fixed Radio Frequency (RF) Coils

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AXIAL LEAD FIXED RADIO FREQUENCY (RF) COILS

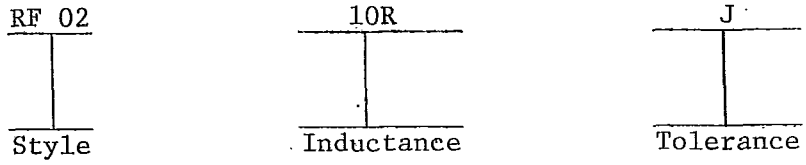
1. SCOPE

This standard covers industrial grade RF coils which are intended as simple inductive elements in RF circuits. They are primarily intended for machine packaging, insertion and soldering on printed wiring boards.

NOTE: The parts described by this standard and the test procedures are based on inductance measurements using an Analog Q Meter System.

1.1 Part Identification and Designation

Parts shall be identified by a designation numbering system as follows:



1.2 Style

The style is identified by the letters RF followed by two digits. Details of the style are given in the detail specifications associated with this standard.

1.3 Performance

The performance identifies the performance and test capability of the part.

TABLE I.

INSPECTION GROUP	TEST	Limits (allowable variation from initial unless otherwise specified)	
		Phenolic & Powdered Iron Core	Ferrite Core
Qualification Inspection (Table V)			
GROUP II			
	L	± 5%	±10%
	Q	±10%	-20%
	DCR	±(3% +.001 ohms)%	±(5% +.001 ohms)%
	SRF	± 8%	-15% from minimum
GROUP IV			
	L	± 3%	± 5%
	Q	±10%	-10% from minimum
GROUP V			
	L	± 5%	± 5%
	Q	±15%	-15% from minimum
	DCR	±(3% + .001 ohms)%	±(3% + .001 ohms)%
	SRF	±10%	-10% from minimum
Group C Inspection (Table VIII)			
SUBGROUP I	L	± 5%	± 5%
	Q	±15%	-15% from minimum
	DCR	±(3% + .001 ohms)%	±(3% + .001 ohms)%
	SRF	±10%	-10% from minimum
SUBGROUP III			
	L	± 5%	±10%
	Q	±10%	-20% from minimum
	DCR	±(3% + .001 ohms)%	±(5% + .001 ohms)%
	SRF	± 8%	-15% from minimum

1.4 Inductance

The inductance value in microhenries is specified by three digits. Except for values below 10 microhenries the first two digits are significant figures and the last digit indicates the number of zeros to follow. For values below 10 uh an R is used to indicate a decimal point. See examples in TABLE II.

Standard inductance values are shown for each style in the detail specifications.

TABLE II

Designation of Inductance Values

DESIGNATION	INDUCTANCE-MICROHENRIES			
R01 to R09	0.01	to	.09	incl.
R10 to R91	0.1	to	.91	incl.
1R0 to 9R1	1.0	to	9.1	incl.
100 to 910	10	to	91	incl.
101 to 911	100	to	910	incl.
102 to 912	1000	to	9100	incl.
103 to 913	10000	to	91000	incl.
104 to 914	100000	to	910000	incl.

1.5 Tolerance

The inductance tolerance shall be specified according to TABLE III

TABLE III.

Inductance Tolerance

Symbol	Inductance Tolerance-Percent (±)
J	5
K	10
M	20

2. APPLICABLE DOCUMENTS

Unless otherwise specified the latest issue of the referenced specifications and standards are applicable.

Standards

EIA	RS-186	Standard Test Methods for Passive Electronic Component Parts
EIA	RS-296	Lead Taping of Components in Axial Lead Configuration for Automatic Insertion
MIL-STD-202		Test Methods for Electronic and Electrical Component Parts
MIL-STD-105		Sampling Procedures and Tables for Inspection by Attributes

Specifications

J-W-1177	Wire, Magnet, Electrical
QQ-S-571	Solder, Tin-Lead Alloy

3. REQUIREMENTS

3.1 Detail Specification Sheets

Detailed requirements are specified in this standard and in the detail specification sheets for individual styles. In case of conflict between this standard and the detail sheets, the latter shall govern.

3.2 Qualification

Parts furnished to this specification may be qualified (certified) to compliance with this specification by being tested to and meeting the requirements of TABLE V.

3.3 Materials

Materials shall be as specified herein. When a definite material is not specified, any material may be used which will enable the part to meet the performance requirements.

3.3.1 Enclosure

Body material must not soften or deform when exposed to the maximum operating temperature specified or when subjected to the specified tests.

3.3.2 Magnet Wire

Insulated wire used in winding shall conform to J-W-1177 when applicable.

3.3.3 Terminals

The terminal lead wires shall be copper with a tin-lead solder coating with a 10% to 90% tin content.

3.4 Marking

Coils shall be marked with four bands, three indicating the inductance in microhenries and the fourth band indicating the tolerance in percent. Color coding shall be in accordance with the color code of Table IV. When either the first or second band of the three bands is gold, this band shall represent the decimal point for inductance values less than 10, and the other two bands shall represent significant figures. For inductance values of 10 or more, the first two bands shall represent significant figures, and the third band shall represent the multiplier. The colors used shall be in accordance with EIA RS-359. Typical color coding for units with inductance values less than 10 and for 10 or greater is shown on Figure 1. The marking shall be legible upon completion of each examination or test.

When specified on the contract or order the coils may be printed in place of being color banded. The printing shall include the inductance value and tolerance as a minimum.

The package marking should include all items listed below:

1. Inductance value (See Paragraph 1.4)
2. Inductance tolerance
3. Type designation
4. Manufacturers trade mark or source code
5. Manufacturing date code

TABLE IV.

Color code.

Color	Significant figure	Multiplier 1/	Inductance tolerance (percent)
Black	0	1	---
Brown	1	10	±1%
Red	2	100	±2%
Orange	3	1,000	±3%
Yellow	4	---	---
Green	5	---	---
Blue	6	---	---
Violet	7	---	---
Gray	8	---	---
White	9	---	---
None 2/	---	---	±20
Silver	---	---	±10
Gold	Decimal point	---	±5

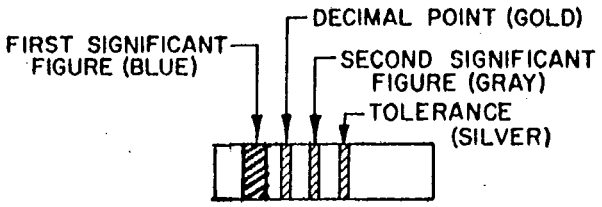
1/ The multiplier is the factor by which the two significant figures are multiplied to yield the nominal inductance value.
2/ Indicates body color.

3.5 Workmanship

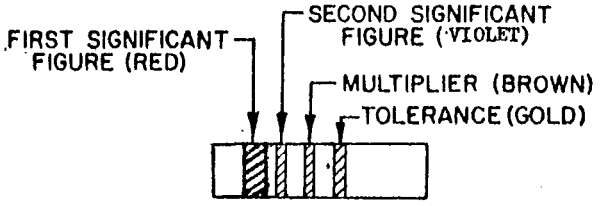
Parts shall be processed in such a manner as to be uniform in quality and be free from defects that will affect life, serviceability or function.

3.6 Packaging

Unless otherwise specified item quantities higher than 499 pieces shall be packaged in accordance with EIA RS-296 "Lead Taping of Components in Axial Lead Configuration for Automatic Insertion". Other quantities shall be in normal commercial bulk packages.



6.8 MICROHENRIES ±10 PERCENT



270 MICROHENRIES ±5 PERCENT

NOTE: The color band for the first significant digit shall be twice the width of the other bands

FIGURE 1. Typical color coding

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer is responsible for verifying that the parts conform to the requirements of this standard and the applicable detail specification.

4.2 Test Equipment and Inspection Facilities

4.3 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the General Requirements of MIL-STD-202.

4.3.1 Precautions

Adequate precautions shall be taken during inspection to prevent condensation of moisture on coils except during the moisture-resistance and thermal shock tests.

4.3.2 Test voltage

The test voltage shall contain no more than 5 percent harmonic distortion.

4.3.3 Test Frequency

When a test frequency is specified without a tolerance, the frequency used shall be within ±1.0 percent of the specified value.

4.3.4 Demagnetization

When necessary to overcome remanence effects, demagnetization is permitted.

4.4 Qualification

Qualification testing shall be performed as specified in TABLE V.

4.4.1 Qualification Sample

A sample consisting of 21 units of the highest value and 21 units of the lowest value for which qualification is sought shall be submitted.

4.4.2 Inspection Routine

The sample shall be subjected to the inspections specified in TABLE V, in the order shown. All sample units except Group III, shall be subjected to the inspection of Group I. The sample shall then be divided as specified in TABLE V for Groups II to VII inclusive, and the sample units subjected to the inspection for their particular group.

4.4.3 Failures

Failures in excess of those specified shall be cause for refusal to grant qualification approval.

4.5 Quality Conformance Inspection

4.5.1 Inspection of Product for Delivery

Inspection of product for delivery shall consist of Groups A and B inspections.

4.5.1.1 Inspection Lot

An inspection lot shall consist of all the coils produced under essentially the same conditions, and offered for inspection at one time. The manufacturer may combine coils of different inductance values and inductance tolerances. The inductance value shall be equally representative of the production lot for that period.

4.5.1.2 Group A Inspection

Group A inspection shall consist of the inspections specified in TABLE VI, in the order shown.

4.5.1.2.1 Sampling Plan (Group A)

Each coil offered for acceptance shall be subject to the Subgroup I inspection. Statistical sampling and inspection for Subgroup II shall be in accordance with MIL-STD-105 for general inspection Level II. The acceptable quality levels (AQL) shall be as specified in TABLE VI. Major and minor defects shall be as defined in MIL-STD-105.

TABLE V.

Qualification Testing

Inspection Test	Test paragraph	Number of sample units to be inspected	Number of failures permitted
Group I (all samples) 1/			
Thermal shock	4.6.2	18	0
Visual and mechanical inspection	4.6.1		
Dielectric Withstanding Voltage	4.6.11		
Electrical Characteristics (Initial)	4.6.3		
Group II 1/			
Life	4.6.4	6	1
Electrical characteristics (final)	4.6.3		
Group III 2/			
Solderability	4.6.5	3	
Resistance to Solvents	4.6.12		
Group IV 1/			
Temperature rise	4.6.6	6	
Overload 3/	4.6.7		
Resistance to Soldering Heat	4.6.8		
Terminal Strength	4.6.10		
Electrical characteristics (final)	4.6.3		
Group V 1/			
Moisture resistance	4.6.9	6	
Electrical characteristics (final)	4.6.3		
Inductance			
Q			

1/ The number of sample units indicated is for each inductance value tested.
2/ The unitsshall not have been previously subjected to any other tests.
3/ After the overload test is performed, a period of 24 hours shall elapse prior to taking electrical characteristics (final) measurements.

TABLE VI.

Group A Inspection

Inspection	Test paragraph	Sampling procedure	
Subgroup I			
Electrical characteristics Inductance - - - - - - Q - - - - - - - - - - -	4.6.3	100% inspection	
Subgroup II		AQL (percent defective) Major	 Minor
Visual and mechanical inspection - - - - - - -	4.6.1	1.0	4.0
Electrical characteristics Self-resonant frequency - DC resistance - - - - - -	 4.6.3.3 4.6.3.4	 1.0 1.0	 --- ---
			---

4.5.1.3 Group B inspection. Group B inspection shall consist of the inspections specified in table IV, in the order shown, and shall be made on sample units which have been subjected to and have passed group A inspection.

4.5.1.3.1 Sampling plan (group B). The sampling plan shall be in accordance with MIL-STD-105 for special inspection level S-4. The sample size shall be based on the inspection lot size from which the sample was selected for group A inspection. The AQL shall be 1.0 percent defective.

4.5.1.3.2 Rejected lots (group B). If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.5.1.3.3 Disposition of sample units. Sample units which have passed all the group B inspection may be delivered on the contract or purchase order, if the lot is accepted and the sample units are still within specified electrical tolerances.

TABLE VII. Group B Inspection

Inspections	Method paragraph
Thermal shock - - - - - - -	4.6.2
Dielectric Withstanding Voltage	4.6.11
Electrical chracteristics	4.6.3
Inductance - - - - - - - - - - -	
Q - - - - - - - - - - - - - -	

4.5.2 Periodic inspection. Periodic inspection shall consist of group C inspection except as specified in 4.5.2.1.3. Delivery of products which have passed groups A and B inspection shall not be delayed pending the results of group C inspection.

4.5.2.1 Group C inspection. Group C inspection shall consist of the inspections in table V, in the order shown. Group C inspection shall be made on sample units selected from inspection lots which have passed the groups A and B inspection.

4.5.2.1.1 Sampling plan.

4.5.2.1.1.1 Quarterly (subgroup I). Every 3 months, 12 sample units, 6 of the highest and 6 of the lowest inductance values shall be inspected.

4.5.2.1.1.2 Monthly (subgroup II). Every month, three sample units of any inductance value shall be subjected to subgroup II inspection.

4.5.2.1.1.3 Semiannually (subgroup III). Every 6 months, six sample units, three of the highest and three of the lowest inductance values shall be subjected to the subgroup III inspection.

TABLE VIII. Group C inspection.

Inspection	Method paragraph	Number of sample units to be inspected	Number of failures permitted
Subgroup I (quarterly)			
Thermal shock	4.6.2	12	1
Electrical characteristics (initial)	4.6.3		
Temperature rise	4.6.6		
Overload	4.6.7		
Moisture resistance	4.6.9		
Electrical characteristics			
Inductance	4.6.3.1		
Q	4.6.3.2		
Resistance to Soldering Heat	4.6.8		
Terminal Strength	4.6.10		
Electrical characteristics (final)	4.6.7		
Subgroup II (monthly)			
Solderability	4.6.5	3	1
Resistance to Solvents	4.6.12		
Subgroup III (semiannually)			
Electrical characteristics (initial)	4.6.3	6	1
Life	4.6.4		
Electrical characteristics (final)	4.6.3		

4.5.2.1.2 Disposition of sample units. Sample units which have been subjected to group C inspection shall not be delivered on the contract or purchase order.

4.5.2.1.3 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action has been taken. After the corrective

action has been taken, Group C inspection shall be repeated on additional sample units.Groups A and B inspection may be reinstituted; however, final acceptance and shipment shall be withheld until the Group C inspection has shown that the corrective action was successful.

4.6 Methods of Test and Requirements

4.6.1 Visual and Mechanical Inspection

Parts shall be inspected under 3X magnification to verify that the materials, design, construction, physical dimensions, markings, and workmanship are in accordance with the applicable requirements.

4.6.2 Thermal shock Coils shall be tested in accordance with EIA RS-186-11 Condition B. The following details and exception shall apply:

a. Mounting - Coils shall not be mounted. They shall be placed in containers which allow circulation of air to each coil.

b. The temperature extremes shall be $-40^{\circ}C\ ^{+0}_{-5}$ and $+125^{\circ}C\ ^{+5}_{-0}$

c. The number of cycles shall be 5

d. Parts shall be held at the temperature extremes for 30 ±5 minutes and the transfer time shall be between 2 and 5 minutes.

e. Measurements after cycling shall take place after stabilization at room temperature and within 24 hours.

When tested as specified there shall be no mechanical damage and the parts shall meet the initial requirements for inductance and Q.

4.6.3 Electrical characteristics The coils shall be mounted by their normal mounting means on the test fixture. The electrical characteristics to be determined shall include inductance, Q, self-resonant frequency, and dc resistance.

4.6.3.1 Inductance. Unless otherwise specified effective inductance of coils shall be measured using the procedure detailed in 4.6.3.1.1. in the specified test fixture in Figure 2.

4.6.3.1.1 Inductance measurement. (10uh and less) The test shall be performed using instruments such as the Hewlett Packard HP4342A. Suitable means shall be used to calibrate the frequency of the Q-meter within ±0.1 percent for the applicable test frequency. Frequencies to be used for testing the various ranges of inductance shall be as follows:

Inductance range, uH	Test frequency, MHz
0.1 to 1.0 incl.....	25.2
Above 1.0 to 10.0 incl	7.96

Effective inductance shall be determined as follows when using the applicable test fixture. The appropriate test fixture shall be inserted in the Q-meter coil terminals. The Q-meter capacitance dial shall be set at 400 picofarads and the vernier capacitance dial at zero. The applicable shorting bar shall be inserted in the clips of the test fixture in such a manner that the terminals rest firmly against the stops, and so that the bar is centered between the test-fixture terminals. The Q-meter shall then be resonated using the frequency dial until a peak reading is obtained. This frequency shall be monitored in order to obtain an accuracy of 0.1 percent. This resonant frequency value in megahertz shall be recorded. The main capacitance dial shall be calibrated periodically in accordance with a routine calibration program for test equipment. The sum of the residual inductance of the Q-meter and the inductance of the test circuit shall be calculated from:

$$L_{cf} = \frac{1}{4\pi^2(f\times10^{-6})^2C} - L_{bar}$$

Where: L_{cf} = Inductance in microhenries of the test fixture and residual inductance of the Q-meter.
f = Frequency in hertz.
C = Capacitance in microfarads.
L_{bar} = Calculated inductance in microhenries of the shorting bar as determined from the following formula:

$$L_{bar} = 0.0002\ell\left(2.303\log_{10}\left(\frac{4\ell}{d}\right) - 1 + \mu\sigma + \frac{d}{2\ell}\right)$$

Where: σ = a quantity as a function of X and if σ is between 0.000 and 0.007, σ can be considered negligible.

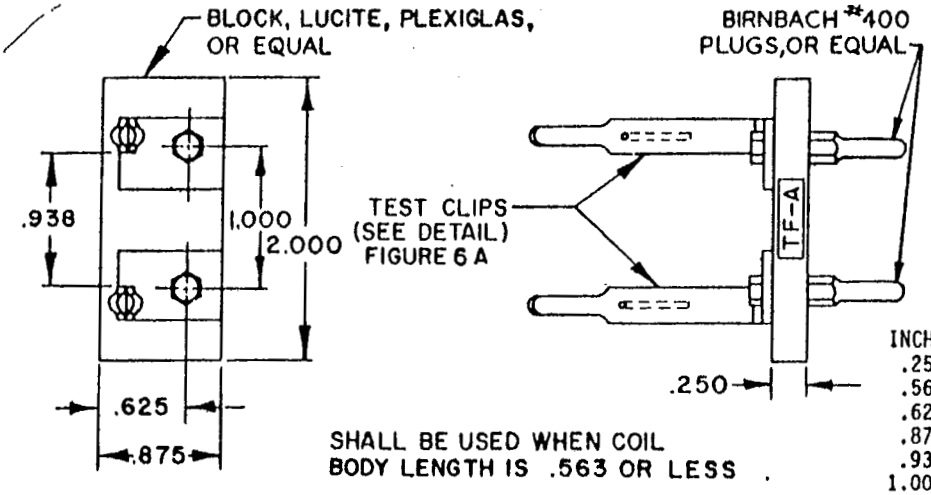
$$X = 0.1405d\sqrt{\frac{\mu F}{p}}$$

Where: ℓ = Length of wire (cm).
d = Diameter of cross section (cm).
μ = Permeability of the material of the wire: $\mu = 1$ for brass or copper.
P = Volume resistivity of wire in microhm-centimeters.
f = Frequency in hertz.

The shorting bar shall then be removed and the Q-meter frequency shall be set to the frequencies specified in 4.6.7.1.1. THe L-C dial of the Q-meter shall then be turned until the resonance meter indicates a peak reading. The inductance (L_d) shall be read directly on the L-C dial, using the inductance scale and the effective inductance (see 3.1) of the inductor calculated from the formula:

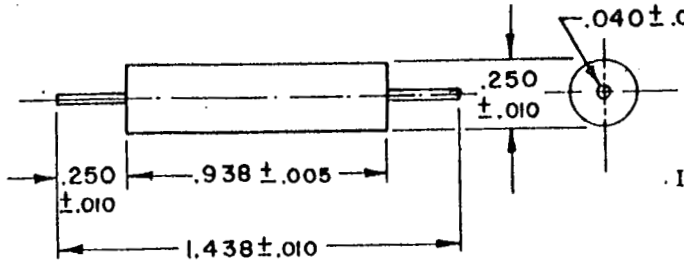
$$L = L_d - L_{cf}$$

Where: L = Effective inductance in microhenries of coils.
L_d = Inductance dial reading in microhenries.
L_{cf} = Correction factor for inductance of test fixture and residual inductance of the Q meter in microhenries.



INCHES	MM
.250	6.35
.563	14.30
.625	15.88
.875	22.22
.938	23.83
1.000	25.40
2.000	50.80

NOTES:
1. Dimensions are in inches.
2. Letters in blocks to be marked on fixture.
3. Unless otherwise specified, tolerance is ±.005 (.13 mm).
4. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
5. Inductance test fixture allowance = .06 uh



COPPER OR BRASS

INCHES	MM
.005	.13
.006	.15
.010	.25
.040	1.02
.250	6.35
.938	23.83
1.438	36.53

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.

FIGURE 2.

SPECIFIED TEST FIXTURE

4.6.3.1.2 Effective inductance (inductance greater than 10 microhenries). Test as specified in 4.6.3.1, except no allowance is made for residual inductance of Q-meter and inductance of test fixture. Frequencies to be used for testing various ranges of inductance shall be as follows:

Inductance range, μH	Test frequency, MHz
Above 10.0 to 100.0, inclusive	2.52
Above 100.0 to 1,000.0, inclusive	0.796
Above 1,000.0 to 10,000.0, inclusive	0.252
Above 10,000.0 to 100,000.0, inclusive	0.0796

4.6.3.2 Q of coils. The test shall be performed using instruments such as the HP4342A Q-meter, or equivalent. Suitable means shall be used to calibrate the frequency of the instrument within ±0.1 percent of the applicable test frequency. Frequencies to be used for testing the various ranges of inductance shall be as specified in 4.6.3.1.1 and 4.6.3.1.2.

4.6.3.3 Self-resonant frequency. Unshielded coils shall be placed in the field of a variable-frequency oscillator, such as McGraw-Edison Model 159 LF megacycle meter, or equivalent. The oscillator shall include a device for indicating the relative amount of power absorbed from the field (e.g., a grid-dip meter). Units shall be suspended or supported a minimum of 1.0 inch from any surface other than the test-fixture supports or oscillator coil. The frequency of the oscillator shall be varied through the frequency range near the self-resonant frequency specified At any frequency in the frequency range where an abrupt increase in power absorption is indicated, the coupling between the oscillator coil and the unit under test shall be decreased, by increasing the separation between the coils, until a moderate dip in grid current results when tuning to this resonance. This frequency shall be considered the self-resonant frequency of the unit, and shall be accurately determined by suitable means to within ±5 percent. A check shall be made for spurious indications due to a resonance not associated with the unit under test, by removing the unit from the field (at frequencies below 2.5 MHz, any suitable method may be used).

4.6.3.3.1 Alternate test method. When coils under test cannot be resonated by the method specified in 4.6.3.3, the test shall be performed using the instruments specified in 4.6.3.1, or equivalent. The coil shall be mounted in the appropriate test fixture The tuning capacitor of the Q-meter shall then be set to approximately 400 pF, and the Q-circuit shall be resonated by adjusting the oscillator frequency of the Q-meter. The unit under test shall then be replaced with a shielded comparison inductor having an inductance about 1/25 that of the unit under test, or a coil that will resonate in the Q circuit at a frequency about 10 times the initial resonant frequency. The Q-meter shall then be set to a frequency approximately 10 times the initial resonant frequency, and the Q-circuit shall then be resonated at this new frequency. (This factor of 10 is based on the distributed capacitance of the unit under test being in the region of 4 pF, which is common for small coils. Higher distributed capacitances will lower the resonant frequency of the unit under test, and a factor smaller than 10 will prevail.) The unit under test shall then be connected across the capacitance terminals of the Q-meter, taking care to avoid coupling between the unit under test and the comparison coils. The Q-circuit shall then be re-resonated by means of the Q-tuning capacitor or the vernier-tuning capacitor, observing whether the capacitance has to be increased or decreased from its previous value, in order to restore resonance. If the capacitance has to be increased, the oscillator frequency shall be increased by 10 to 20 percent. If the capacitance has to be decreased, the oscillator frequency shall be decreased by the same amount. The unit under test shall then be disconnected from the Q-meter, and the Q-circuit shall be resonated to the new frequency by means of the Q-tuning capacitor. The previous precedure shall then be repeated, while at the same time changing the oscillator frequency by smaller

increments as it approaches the resonant frequency of the unit under test, until the frequency reaches a value at which the Q-circuit capacitance is unchanged when the unit under test is connected or disconnected. The self-resonant frequency of the unit under test will then be the frequency of the oscillator and shall be accurately determined to within ±0.2 percent (see 3.10.3).

4.6.3.4 DC resistance. Direct current (dc) resistance of coils shall be measured in accordance with method 303 of MIL-STD-202.

4.6.4 Life. Coils shall be tested in accordance with method 108 of MIL-STD-202. The following details and exceptions shall apply.

a. Test condition letter - F.

b. Method of mounting - Parts shall be mounted on lightweight terminals on each side of the body. The effective length of each terminal shall be 0.50 + .250 inches.
- .0

c. Ambient test temperature and tolerance shall be 90° ±2°C.

d. Operating conditions - 100 percent rated cyclic loaded conditions 1-1/2 hours on and 1/2 hour off, for the applicable number of hours specified and at the ambient test temperatures. "On time" shall be three-fourths of the total lapsed time.

e. Initial measurements - Initial measurements shall be performed at room temperature prior to subjecting the coil to the specified test temperature. These initial measurements shall be used as reference in determining degradation limits after exposure to the test temperature for each of the specified test intervals.

f. Measurements after exposure to the test temperature - Final measurements shall be made after each of the following intervals: 250 +48, -0; 500 +48, -0; 1,000 +48, -0; and 2,000 +72, -0 hours. The coil shall be stabilized at room temperature for a minimum of 1/2 hour after removal from the test chamber prior to taking measurements. Coils shall remain at room temperature for no greater period of time than necessary to perform the required measurements before return to that temperature.

g. Degradation limits - Unless otherwise specified, coils shall not exceed the degradation limits specified up to and including the 2,000-hour test interval.

h. Inspection after test - Coils shall be inspected for evidence of mechanical damage.

When tested as specified there shall be no evidence of mechanical damage and the changes in electrical chartacteristics shall not exceed the allowed final characteristic degradation (See TABLE I.).

4.6.5 Solderability

Coils shall be tested according to MIL-STD-202, Method 208. Both end terminations shall be tested.

When tested as specified the immersed metallized surface shall be at least 95 percent covered with a new clean smooth coating and shall exhibit no demetallization or leaching of the terminal areas. The remaining 5 percent may contain only small pinholes or rough spots, these shall not be concentrated in one area. In case of dispute, the percentage of coverage with pinholes or rough spots shall be determined by actual measurement of these areas, as compared to the total area.

4.6.6 Temperature rise. The temperature rise of cylindrical insulated coils shall be determined as specified in 4.6.6.1.

This test shall be performed at the specified ambient temperature and with rated dc applied. When the resistance of the winding, measured at 5-minute intervals, remains constant, the temperature of the winding shall be considered stabilized. If the method used for determining the resistance of the winding requires the removal of power, the measurement shall be made within 10 seconds after the removal of power.

4.6.6.1 For cylindrical insulated coils. The coil under test shall be connected to a test fixture conforming to figure 11 with each wire lead wrapped one turn around the test-fixture terminal and shall be soldered to the terminal for uniform low contact resistance. The test fixture, with the attached coil, shall then be placed in a test chamber which allows forced-air circulation to be shut off during testing. The test chamber shall be free of test-area drafts and direct thermal radiation. A termperature-indicating device with an accuracy of ±0.5°C shall be located in the area surrounding the coil under test, but not where it will be influenced by the temperature rise of the coil. The test chamber temperature shall then be stabilized at the specified ambient temperature.

The dc resistance (r) shall be measured with one-tenth rated dc applied at the specified ambient temperature (t). When the resistance of the coil is stabilized, the resistance value shall be recorded. The ammeter-voltmeter method may be used for determining this resistance provided that the accuracy of these meters is 0.5 percent or better and the resistance of the voltmeter is at least 1,000Ω per volt. The rated dc shall then be applied to the coil under test, using a stable current source such as a storage battery. Forced-air circulation shall be shut off when rated current is applied. When the resistance of the coil under test is stabilized with rated current applied, the resistance (r) and the test chamber temperature (T) shall be recorded. The temperature rise (ΔT) shall be calculated by the following formula:

$$\Delta T = \frac{R - r}{r} (t + 234.5) - (T - t)$$

Where: ΔT = Temperature rise in °C above the specified ambient temperature of the coil under test.

R = Resistance of coil in ohms with rated dc applied at temperature (T + ΔT).

r = Resistance of coil in ohms at temperature (t), the specified ambient temperature.

t = Stabilized specified ambient temperature in °C of the coil under test without dc applied.

T = Ambient temperature in °C (at time forced-air circulation is shut off) with rated dc applied. T shall not differ from t by more than 5°C.

4.6.7 Overload

Coils shall be mounted on a test substrate as specified in 4.6.1.2. DC current equivalent to 1-1/2 times the specified rated current shall be applied to the windings for 5 minutes. After the test, chip coils shall be inspected for evidence of arcing, burning, and charring.

When tested as specified there shall be no mechanical damage and the changes in electrical characteristics shall not exceed the allowed final characteristic degradation (See TABLE I.).

4.6.8 Resistance to Soldering Heat

The terminal lead wires shall be tested in accordance with method 210 of MIL-STD-202. The following details shall apply:

a. Depth of immersion in molten solder -0.125 inch from the nearest insulating material, or to 1/2 the exposed length of the terminal, whichever point is closer to the insulating material.
b. Test-condition letter - A. After the test and as soon as the soldered terminals have returned to room ambient temperature, the coils shall be examined for evidence of mechanical damage and loosening of the terminals.

When tested as specified there shall be no mechanical damage and the termination surface shall remain continuous with no dewetting of the solder surface.

4.6.9 Moisture Resistance

Coils shall be tested in accordance with EIA RS-186-2 (10 days, cycled)

a. Mounting - On racks. Cylindrical insulated coils shall be soldered by their leads to rigid mounts or terminal lugs. The spacing of the mounts or terminal lugs shall be such that the length of each coil lead is approximately 0.25 inch when measured from the edge of the supporting terminal to the coil body. For polarization the coils shall be covered with a flat, corrosion-resistant metal strap whose width is equal to the length of the coils and of sufficient thickness to be rigid. A 0.075-inch thick layer of conductive, moisture-resistant, resilient material, having a resistivity of less than 1,000 Ωcm, shall be bonded to the surface of the strap next to the coils. Sufficient contact pressure shall be maintained by applying a compressive force between the strap and a cylindrical, corrosion-resistant, nonconducting rod held beneath the coils, The mounting strap may be used to cover one or more coils at a time.

b. Polarization - During steps 1 to 6 inclusive a 100 volt DC potential shall be applied between the metal strap and the leads tied together. The positive lead of the potential shall be connected to the coil leads.

c. Step 7b is not required.

d. Final measurements - Following the 1-1/2 to 3-1/2 hour conditioning period, unless otherwise specified the units shall be removed to room ambient conditions. Within 30 minutes after removal, the dielectric withstanding voltage specified and the units shall be examined for evidence of corrosion. Within 24 hours shall these measurements, the specified electrical characteristics shall be measured as specified in 4.6.3 and the units shall be examined for evidence of corrosion.

When tested as specified there shall be no mechanical damage and the changes in electrical characteristics shall not exceed the allowed final characteristic degradation (See TABLE I).

4.6.10 Terminal strength

4.6.10.1 Pull.

4.6.10.1.1 All terminals. Each terminal shall be tested in accordance with method 211 of MIL-STD-202. The following details shall apply:

a. Test-condition letter - A.
b. Applied force - Unless otherwise specified the applied force shall be 5 pounds.

4.6.10.2 Twist.

4.6.10.2.1 Solid wire lead terminals
Each terminal shall be tested in accordance with test condition D, method 211, of MIL-STD-202.

4.6.11 Dielectric withstanding voltage Coils shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

a. Special preparation or conditions - Cylindrical insulated coils shall be clamped in the trough of a 90 degree metallic V-block using a metallic strap with a 0.075-inch thick layer of conductive moisture-resistant resilient material, having a resistivity of less than 1,000 Ω per centimeter, shall be bonded to the surface of the strap next to the coils. The body of the coil shall not extend beyond the extremities of the block or resilient material. The surface of the V-block shall be free from contamination. The coil leads shall be so positioned that the distance between the leads and any point of the V-block shall be not less than the radius of the coil and minus the radius of the lead wire. The metallic V-block shall be of noncorrosive material. Other types of coils shall be tested by any other suitable means.
b. Magnitude of test voltage - The ac test voltage shall be a minimum of 1,000 V with a leakage current not to exceed 100 μA unless otherwise specified
The time duration shall be a minimum of 60 seconds.
c. Points of application of test voltage - Unless otherwise specified the test voltage shall be applied between the leads of the coil connected together and the V-block with block and metal strap at ground potential.

d. When tested as specified the leakage current shall not exceed 100uA and there shall be no arcing, flashover, breakdown of insulation or other damage.

4.6.12 Resistance to Solvents

Coils shall be tested in accordance with Method 215 of MIL-STD-202.

When tested as specified there shall be no evidence of mechanical damage and the color code bands shall remain legible.

Detail Specification for Axial Lead RF Coil

Style RF 02

This specification describes an industrial grade axial lead RF coil intended for machine packaging, insertion and soldering in printed wiring boards.

1. Description

1.1 Dimension and Configuration: See Figure 1

1.2 Operating Temperature: -40°C to +90°C at full rated current - derated to 0 current at 125°C

1.3 Storage Temperature: -55°C to +125°C

1.4 Temperature Rise (at 90°C): 35°C

1.5 Dielectric Withstanding Voltage: 1000V AC

1.6 Electrical Characteristic (Initial): See Table I

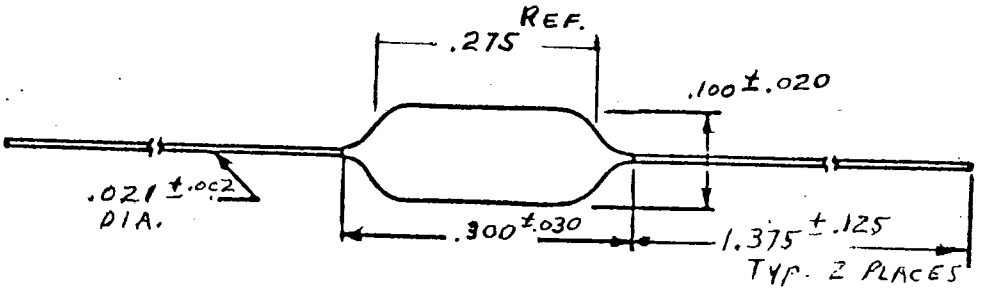
1.7 Electrical Characteristic (Final): Requirements of EIA-551. *

2.0 Designation: The designation shall be as described in Paragraph 1.1 of EIA-551.*

*PN-2007, to be published at a later date.

STYLE RF02

FIGURE 1



Dimensions in inches

NOTES:

1. The envelope shape is optional

2. When reel taped packaging is used the lead length is governed by EIA RS-296.

TABLE I
TYLE RF 02
ELECTRICAL CHARACTERISTICS (INITIAL)

IND. (uH)	Q MIN.	TEST FREQ. L & Q (Mhz)	SELF-RESONANT FREQ. MIN (Mhz)	DC RESISTANCE MAX. (Ω)	RATED DC CURRENT (ma)	CORE MATERIAL
.10	40	25.2	680	.08	1350	
.12	40	25.2	640	.09	1270	
.15	38	25.2	600	.10	1200	
.18	35	25.2	550	.12	1105	
.22	33	25.2	510	.14	1025	
.27	33	25.2	430	.16	960	
.33	30	25.2	410	.22	815	Phenolic
.39	30	25.2	365	.30	700	
.47	30	25.2	330	.35	650	
.56	30	25.2	300	.50	545	
.68	28	25.2	275	.60	495	
.82	28	25.2	250	.85	415	
1.00	25	25.2	230	1.00	385	
1.20	25	7.96	150	.18	590	
1.50	28	7.96	140	.22	535	
1.80	30	7.96	125	.30	455	
2.20	30	7.96	115	.40	395	
2.70	37	7.96	100	.55	355	
3.30	45	7.96	90	.85	270	
3.90	45	7.96	80	1.00	250	
4.70	45	7.96	75	1.20	230	
5.60	50	7.96	65	1.80	185	Iron
6.80	50	7.96	60	2.00	175	
8.20	55	7.96	55	2.70	155	
10.0	55	7.96	50	3.70	130	
12.0	45	2.52	40	2.70	155	
15.0	40	2.52	35	2.80	150	
18.0	50	2.52	30	3.10	145	
22.0	50	2.52	25	3.30	140	
27.0	50	2.52	20	3.50	135	
33.0	45	2.52	24	3.4	130	
39.0	45	2.52	22	3.6	125	
47.0	45	2.52	20	4.5	110	
56.0	45	2.52	18	5.7	100	
68.0	50	2.52	15	6.7	92	
82.0	50	2.52	14	7.3	88	
100	50	2.52	13	8	84	
120	30	.796	12	13	66	
150	30	.796	11	15	61	
180	30	.796	10	17	57	Ferrite
220	30	.796	9	21	52	
270	30	.796	8	25	47	
330	30	.796	7	28	45	
390	30	.796	6.5	35	40	
470	30	.796	6	42	36	
560	30	.796	5	46	35	
680	30	.796	4	60	30	
820	30	.796	3.8	65	29	
1000	30	.796	3.4	72	28	

Note: Standard Inductance Tolerance = ±10%

Detail Specification for Axial Lead RF Coil

Style RF04

This specification describes an industrial grade axial lead RF coil intended for machine packaging, insertion and soldering in printed wiring boards.

1. Description

1.1 Dimension and Configuration: See Figure 1

1.2 Operating Temperature: -40°C to +90°C at full rated current - derated to 0 current at 125°C

1.3 Storage Temperature: -55°C to +125°C

1.4 Temperature Rise (at 90°C): 35°C

1.5 Dielectric Withstanding Voltage: 1000V AC

1.6 Electrical Characteristic (Initial): See Table I

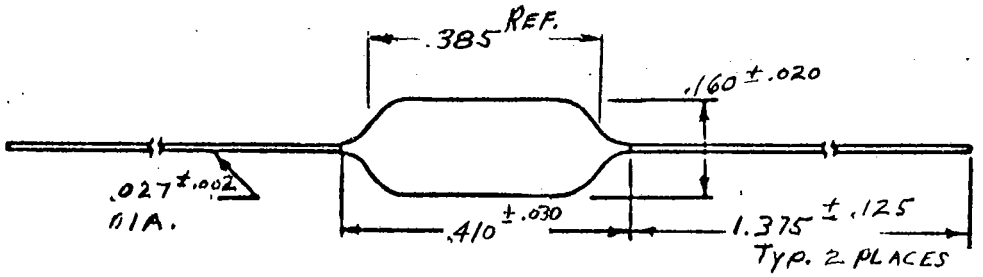
1.7 Electrical Characteristic (Final): Requirements of EIA-551.*

2.0 Designation: The designation shall be as described in Paragraph 1.1 of EIA-551.*

*PN-2007, to be published at a later date.

STYLE RF04

FIGURE 1



Dimensions in Inches

NOTES:

1. The envelope shape is optional

2. When reel tape packaging is used the lead length is governed by EIA RS-296.

TABLE I
STYLE RF 04
ELECTRICAL CHARACTERISTICS (INITIAL)

IND. (uH)	Q MIN.	TEST FREQ. L & Q (Mhz)	SELF-RESONANT FREQ. MIN (Mhz)	DC RESISTANCE MAX. (Ω)	RATED DC CURRENT (ma)	CORE MATERIAL
.15	50	25.2	525	.03	2450	
.22	50	25.2	450	.055	1810	
.33	45	25.2	360	.09	1400	
.47	45	25.2	310	.12	1225	
.56	50	25.2	280	.135	1150	
.68	50	25.2	250	.15	1100	
.82	50	25.2	220	.22	900	
1.00	50	25.2	200	.29	785	Phenolic
1.20	33	7.96	180	.42	650	
1.50	33	7.96	160	.50	600	
1.80	33	7.96	150	.65	525	
2.20	33	7.96	135	.95	435	
2.70	33	7.96	120	1.20	385	
3.30	33	7.96	110	2.00	300	
3.90	33	7.96	100	2.30	280	
4.70	33	7.96	90	2.60	260	
5.60	45	7.96	60	.32	495	
6.80	50	7.96	55	.50	395	
8.20	50	7.96	50	.60	360	
10	55	7.96	45	.90	290	
12	65	2.52	42	1.10	265	
15	65	2.52	40	1.40	240	
18	75	2.52	34	2.25	185	
22	75	2.52	30	2.50	175	
27	60	2.52	25	2.60	170	
33	65	2.52	19	3.00	165	
36	60	2.52	15.5	2.50	180	
39	60	2.52	14.5	2.60	176	
43	60	2.52	13.7	2.70	172	
47	55	2.52	13.0	2.75	170	
51	55	2.52	12.7	2.85	167	
56	55	2.52	12.0	3.00	164	Iron
62	55	2.52	11.5	3.15	160	
68	55	2.52	11.0	3.30	156	
75	55	2.52	10.5	3.70	147	
82	50	2.52	10.3	3.90	143	
91	50	2.52	10.0	4.30	136	
100	50	2.52	9.5	4.50	133	
110	60	.796	8.9	4.90	128	
120	65	.796	8.7	5.20	124	
130	65	.796	8.5	5.45	121	
150	65	.796	8.0	6.05	114	
160	65	.796	7.5	6.40	111	
180	65	.796	7.0	6.75	108	
200	65	.796	6.5	7.10	106	
220	65	.796	6.2	7.45	103	
240	65	.796	5.9	7.80	101	

NOTE:
Standard tolerances = ±20% for values .15uh to .47uh
= ±10% for values .56uh to 33uh
= ± 5% for values 36uh to 240uh